WHAT IS CLAIMED IS:

1. An arrayed waveguide grating, comprising:

a substrate;

a first channel waveguide disposed on the substrate;

a channel waveguide array disposed on said substrate and constituted in such that each length of waveguides is sequentially longer with a predetermined difference in lengths of the waveguides;

a first slab waveguide disposed on said substrate and connecting said first channel waveguide with said channel waveguide array;

a second slab waveguide disposed on said substrate and connecting an end of said channel waveguide array on the side wherein said first slab waveguide has not been connected thereto with an end thereof; and

a second channel waveguide disposed on said substrate and connected to the other end of said second slab waveguide wherein a waveguide part in the connected area has a parabolic configuration.

2. An arrayed waveguide grating, comprising:

a substrate;

a first channel waveguide disposed on the substrate;

a channel waveguide array disposed on said substrate and constituted in such that each length of waveguides is sequentially longer with a predetermined difference in lengths of the waveguides;

a first slab waveguide disposed on said substrate and connecting said first channel waveguide with said channel waveguide array;

a second slab waveguide disposed on said substrate and connecting an end of said channel waveguide array on the side wherein said first slab waveguide has not been connected thereto with an end thereof; and

a second channel waveguide disposed on said substrate and connected to the other end of said second slab waveguide wherein a waveguide part in the connected area has a configuration as a multi-mode interference in which a width of optical waveguide changes step-functionally and discontinuously.

3. An arrayed waveguide grating, comprising:

a substrate;

a first channel waveguide disposed on the substrate;

a channel waveguide array disposed on said substrate and constituted in such that each length of waveguides is sequentially longer with a predetermined difference in lengths of the waveguides;

a first slab waveguide disposed on said substrate and connecting said first channel waveguide with said channel waveguide array;

a second slab waveguide disposed on said substrate and connecting an end of said channel waveguide array on the side wherein said first slab waveguide has not been connected thereto with an end thereof; and

a second channel waveguide disposed on said substrate and

connected to the other end of said second slab waveguide wherein a waveguide part in the connected area has a rectangular field distribution exciting configuration that excites a rectangular field distribution.

4. An arrayed waveguide grating as claimed in claim 1, wherein:

said parabolic configuration is individually adjusted in response to respective wavelengths of multiplexed optical signals input to said first channel waveguide.

5. An arrayed waveguide grating as claimed in claim 2, wherein:

said configuration as a multi-mode interference is individually adjusted in response to respective wavelengths of multiplexed optical signals input to said first channel waveguide.

6. An arrayed waveguide grating as claimed in claim 3, wherein:

said rectangular field distribution exciting configuration is individually adjusted in response to respective wavelengths of multiplexed optical signals input to said first channel waveguide.

7. An arrayed waveguide grating as claimed in claim 3, wherein:

said rectangular field distribution exciting configuration is such a configuration that an angle θw defined by a boundary part of an outputting channel waveguide in a starting point from which

a width of waveguide changes and a central axis of the waveguide has a value larger than zero degree and smaller than ninety degrees, and tapered configurations are excluded from these resulting configurations.

8. An optical communication system, comprising:

an optical transmission means for delivering optical signals having respective wavelengths in parallel;

a multiplexer composed of arrayed waveguide gratings for subjecting the optical signals having the respective wavelengths delivered from said optical transmission means to wavelength division multiplexing;

an optical transmission line for transmitting the optical signals which have been wavelength division-multiplexed and output from said multiplexer;

nodes each provided with an arrayed waveguide grating disposed properly in the middle of said optical transmission line;

a demultiplexer composed of an arrayed waveguide gratings to which optical signals delivered through said nodes disposed on said optical transmission line are input to separate into each of optical signals having respective wavelengths; and

an optical receiver for receiving optical signals having the respective wavelengths separated by said demultiplexer;

each of said arrayed waveguide gratings being composed of a substrate; a first channel waveguide disposed on the substrate; a channel waveguide array disposed on said substrate and constituted in such that each length of waveguides is sequentially longer with a predetermined difference in lengths of the

waveguides; a first slab waveguide disposed on said substrate and connecting said first channel waveguide with said channel waveguide array; a second slab waveguide disposed on said substrate and connecting an end of said channel waveguide array on the side wherein said first slab waveguide has not been connected thereto with an end thereof; and a second channel waveguide disposed on said substrate and connected to the other end of said second slab waveguide wherein a waveguide part in the connected area has a rectangular field distribution exciting configuration that excites a rectangular field distribution.

9. An optical communication system, comprising:

an arrayed waveguide grating having a circular transmission line prepared by connecting circularly a plurality of nodes by means of transmission lines and transmitting optical signals which have been wavelength division-multiplexed to these transmission lines, and separating the wavelength division-multiplexed optical signals into optical signals having respective wavelengths; and

an arrayed waveguide grating for wavelength division-multiplexing optical signals, which have been separated into those having respective wavelengths;

each of these respective arrayed waveguide gratings being composed of a substrate; a first channel waveguide disposed on the substrate; a channel waveguide array disposed on said substrate and constituted in such that each length of waveguides is sequentially longer with a predetermined difference in lengths of the waveguides; a first slab waveguide disposed on said substrate and connecting said first channel waveguide with said channel

waveguide array; a second slab waveguide disposed on said substrate and connecting an end of said channel waveguide array on the side wherein said first slab waveguide has not been connected thereto with an end thereof; and a second channel waveguide disposed on said substrate and connected to the other end of said second slab waveguide wherein a waveguide part in the connected area has a rectangular field distribution exciting configuration that excites a rectangular field distribution.